Welcome to this issue of

NATIONAL SECURITY SCIENCE

The world remains a dangerous and unstable place. Russia is loudly rattling its conventional and nuclear sabers. North Korea appears to be striving to build its own nuclear-armed intercontinental ballistic missiles. Every declared nuclear-armed nation is increasing and/or modernizing its nuclear stockpile. More nations are debating whether to acquire their own nuclear weapons.

The continuing need for the U.S. nuclear deterrent grows in direct proportion to these growing threats to U.S. national security and to the security of its allies.

But the nuclear deterrent faces a challenge. The United States used to regularly shake the earth testing its nuclear weapons. These weren't just tests, of course—they were also demonstrations for U.S. adversaries and allies alike that U.S. nuclear weapons packed a seismic punch. We have not sent that awe-inspiring message in 23 years.

Since the last U.S. nuclear test in 1992, the world's population has grown by two billion people. These generations were born after U.S. nuclear testing ceased and probably have never even seen a photograph of a test. (See "Atomic Photography—Blasts From the Past," page 16.)

So, while the importance of the U.S. nuclear deterrent is more relevant now than ever, the nation does not overtly demonstrate to the world (or to itself), consistent with Presidents Bill Clinton's and George W. Bush's decisions to halt nuclear testing, that its aging nuclear weapons still work. The nation's mightiest message is muted at this most dangerous moment.

How then does the nation continue to convey to its adversaries and allies—and even to its own military—that two decades later its nuclear deterrent still packs its punch?

The United States promises that its warheads are safe, are secure, and will work, based upon the expertise of the scientists and engineers at the Laboratory (and other nuclear weapons labs)

doing stockpile stewardship. In 2014 alone, Los Alamos conducted more than 1,000 experiments to more fully understand the nation's nuclear deterrent. But that largely secret science cannot be made public.

Yet without testing—or demonstrating much of the science that has replaced testing—what is it that makes this promise credible?

Because the United States can't "show the money," we are compelled to show something else. The nation is betting that demonstrating major scientific excellence in other areas will build trust in the science that stewards the stockpile. If the nation continues to demonstrate its worldwide scientific superiority in nonnuclear weapons science, our scientists and engineers, like those at Los Alamos, can promise that the U.S. stockpile is still good to go, and our adversaries and allies, along with our own warfighters, will have faith in that promise.

A startling truth now emerges: In the absence of the direct empirical evidence of testing, the nation's scientific credibility is now a key element of successful nuclear deterrence and, thus, a pillar of U.S. national security.

This is why Los Alamos is so important to the nation—now more than ever; it not only stewards the stockpile, but also demonstrates the scientific excellence required to maintain the scientific credibility that has become a stanchion of U.S. national security. Clearly, Los Alamos must continue to protect and enhance its scientific credibility; the nation's security depends on it.

Deterrence is based on what your adversaries believe you have. In the absence of testing a warhead that shakes the earth, the Laboratory keeps the faith in the nuclear deterrent by doing science that shakes the earth.

The question now is how long will the nation's adversaries, allies, and its own warfighters continue to keep a faith that's based on indirect evidence?

Craig Leasure
Principal Associate Director, Weapons Program (acting)